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(54) Soil cultivating implements

(57) In a soil cultivating implement, such as a rotary harrow, which comprises a plurality of soil working members 3 rotatably carried in a row by a hollow frame portion that extends substantially horizontally perpendicular to the intended direction of operative travel of the implement, each soil working member 3 comprises a tine carrier 4 whose opposite ends are provided with tine holders 5 that turnably receive corresponding swivel units 8. Each swivel unit 8 comprises a plug 7 angularly displaceable about an axis *b* but maintained against displacement lengthwise of that axis *b* by a retaining pin 15 that intrudes into a groove 16A circumscribing the plug 7. Each unit 8 also comprises an eccentric portion 17 formed with a bore 18 in which a fastening portion 19 of a corresponding square cross-section tine 20 is replaceably mounted by the provision of a retaining pin 21. The tines 20 can thus be replaced, when worn, without having to replace the swivel units. A grease nipple 23 communicates with each circumscribing groove 16A and the lowermost end of each tine 20 is steeply bevelled.

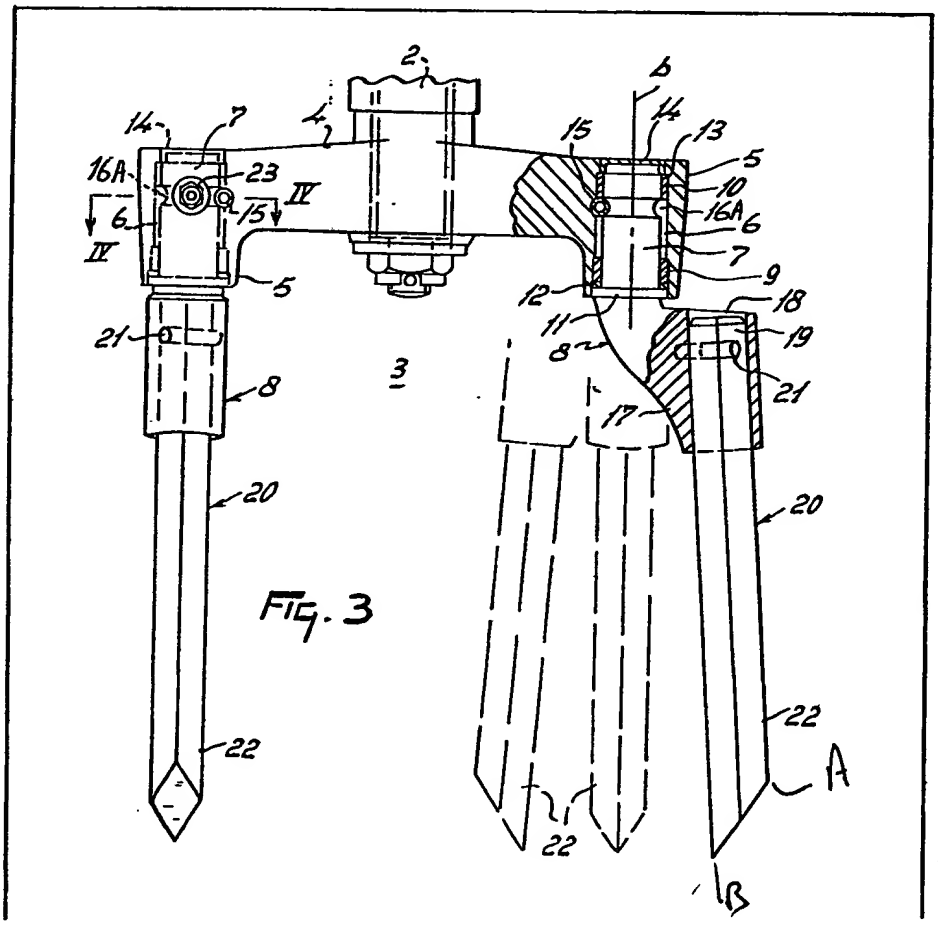

Fig. 3

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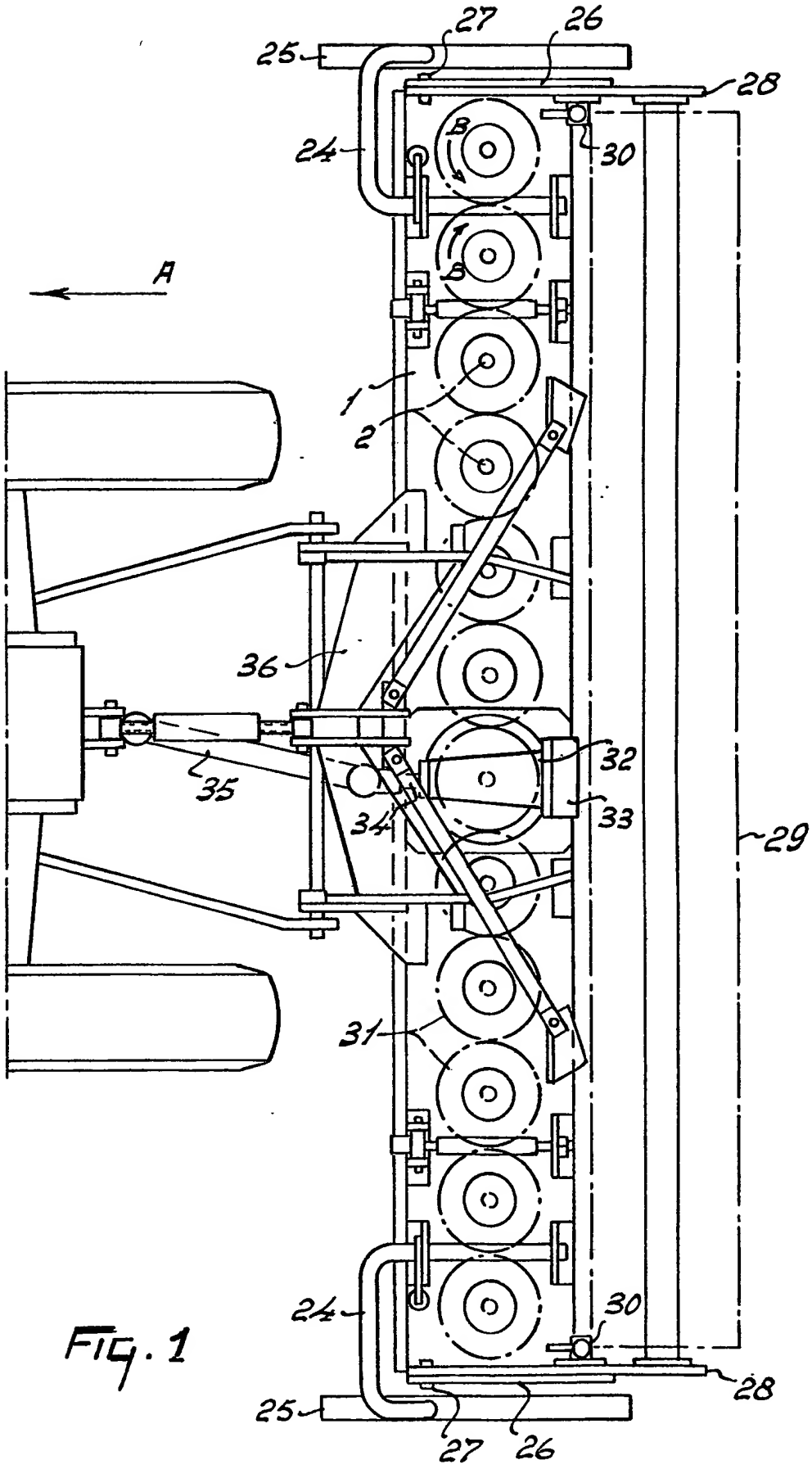

FIG. 1

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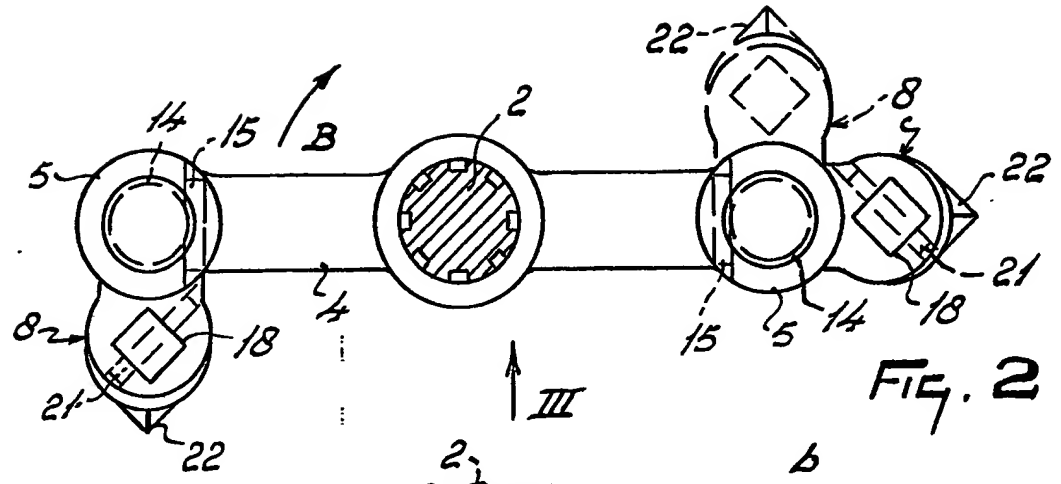

FIG. 2

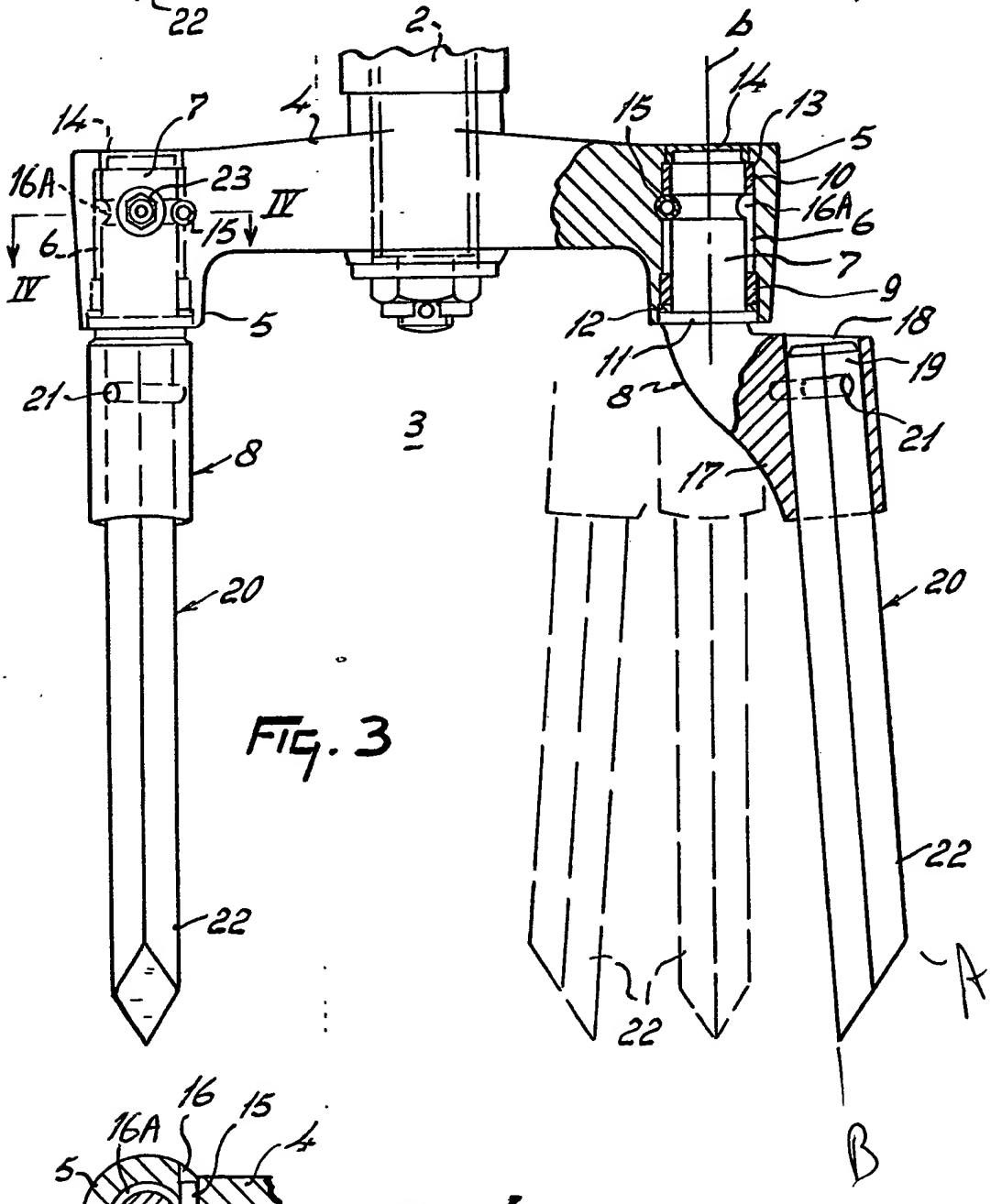

FIG. 3

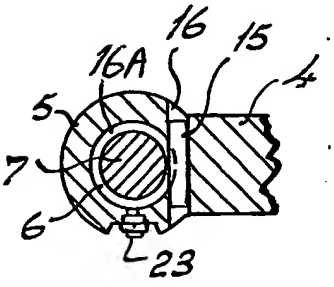

FIG. 4

SPECIFICATION

Soil cultivating implements

This invention relates to soil cultivating implements or machines, such as rotary harr ws, of the kind which comprise a frame portion movable over the ground and a plurality of soil working members supported by that frame portion so as to be drivable about substantially vertical, or at least upwardly extending, axes, at least some of the soil working members each including at least one swivel unit provided with at least one soil working tine. The term "implement(s) or machine(s)" will be shortened to "implement(s)" alone throughout the remainder of this document for the sake of brevity.

In known implements of the kind set forth, the tines are integral with, or fixedly secured to, their swivel units so that, when a tine is worn out, the swivel unit has also to be replaced; this is costly and wasteful of material. An object of the present invention is to overcome, or very greatly to reduce, this disadvantage and, accordingly, one aspect of the invention provides a soil cultivating implement of the kind set forth, wherein the tines are releasably secured to the swivel units by retaining pins.

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:—

Figure 1 is a somewhat diagrammatic plan view of a soil cultivating implement that includes parts constructed in accordance with the invention, the implement being shown connected to the rear of an agricultural tractor,

Figure 2 is a sectional plan view, to an enlarged scale, showing the tine carrier of one rotary soil working member of the implement together with two tine holders and tined swivel units that are turnably mounted in those holders,

Figure 3 is a part-sectional side elevation as seen in the direction indicated by an arrow III in Figure 2, and

Figure 4 is a section taken on line IV—IV in Figure 3.

Referring to the accompanying drawings, the soil cultivating implement that is illustrated therein is in the form of a rotary harrow that is intended principally for use in the preparation of a good quality seed bed in which seeds will readily germinate and the resultant seedlings will grow on to maturity after thinning out thereof when so required. The implement comprises a hollow frame portion 1 that extends substantially horizontally transverse and usually, as illustrated in Figure 1 of the drawings, substantially horizontally perpendicular to the intended direction of operative travel of the implement that is indicated in the same figure by an arrow A. A plurality of shafts 2, of which there are twelve in the example that is being described, are rotatably journalled in bearings (not shown) carried by the upper and lower walls of the hollow frame portion regularly spaced apart intervals in a single row. Advantageously, but not absolutely essentially, the longitudinal axes of the shafts 2, which are also their axes of rotation, are spaced apart from n another at intervals of 25 cm, the shafts 2 all being disposed either substantially vertically (as illustrated) or at least in upwardly extending positions in which they are steeply inclined to the horizontal ground surface.

The lower end of each shaft 2 projects downwardly from beneath the bottom of the hollow frame portion 1 and there has the central hub of a corresponding tine carrier or support 4 firmly but releasably secured to it in any known or other convenient manner such as the known manner that is illustrated in Figures 2 and 3 of the drawings, this involving the use of external splines on the downwardly projecting portion of each shaft 2 and matching internal splines in the hub of the corresponding tine carrier 4. This prevents rotation of each carrier 4 relative to the shaft 2 whilst a nut, provided with a split pin, co-operates with a lowermost screw-threaded end of each shaft 2 and, with the aid of upper and lower washers, prevents axial displacement of each carrier 4 along its shaft 2.

Each tine carrier 4 comprises two arms which radiate substantially horizontally from opposite sides of its central hub, the radially outer ends of the two arms integrally supporting corresponding sleeve-like tine holders 5 of a substantially circular cross-section and a generally cylindrical form, each holder 5 having a stepped bore 6 of circular cross-section formed axially therethrough from top to bottom. As will be further described below, the tine holders 5 turnably support corresponding swivel units 8 and each swivel unit 8, in turn, is provided with a corresponding soil working tine 20. Each assembly of one tine carrier 4, two tin holders 5, two swivel units 8 and two tines 20 constitutes a corresponding soil working member 3 that is rotatable about the substantially vertical, or at least, upwardly extending, axis of the shaft 2 to whose lower end it is firmly but releasably secured.

The longitudinal axis *b* of each bore 6 is parallel or substantially parallel to the longitudinal axis/axis of rotation of the corresponding shaft 2 and each bore 6 turnably receives a generally cylindrical plug 7 that is an upper part of the corresponding swivel unit 8. The diameter of each plug 7 is a little less than that of each bore 6, the clearance being compensated for by the provision of spaced lower and upper plain bearings 9 and 10. Th lower end of each plug 7 is formed with a sh ulder 11 above which a sealing ring 12 lies between said shoulder 11 and the lower end of the corresponding lower plain bearing 9. The shoulder 11 and the sealing ring 12 are accommodated in a milled portion at the lower end of the corresponding bore 6 and together provide a simple but satisfactory seal against fouling of the bearings 9 and 10 conc rned by the penetration of abrasive dirt.

abuts against an internal shoulder 13 of the corresponding bore 6 and a hood-shaped cap 14 closes the upper end of the bore 6, being provided with a downwardly projecting rim whose lower end contacts the upper end of both the plug 7 concerned and its upper plain bearing 10. Each plug 7 is rotatable in the corresponding bore 6 about its own longitudinal axis which, when installed, coincides with the respective axis *b* and is positively prevented from becoming axially displaced lengthwise by the axis *b* by the provision of a corresponding resilient retaining pin 15 of circular cross-section that is received in a corresponding bore 16 (Figure 4 of the drawings), the bore 16 extending substantially horizontally in a direction that is tangential to an imaginary circle centered upon the axis of rotation of the corresponding shaft 2 at a location where the corresponding carrier arm 4 and tine holder 5 are, integrally connected to one another, this location being at a level which is spaced downwardly from the upper end of the corresponding plug 7 by a distance which is substantially one-third of the upright length of that plug 7. A groove 16A circumscribes each plug 7 and is of substantially semi-circular profile, the groove 16A being located at the same horizontal level as is the corresponding bore 16 which bore 16, as can be seen in the drawings, is so positioned that, when the retaining pin 15 concerned is located therein, the cylindrical wall of that pin 15 intrudes into the registering groove 16A to prevent the plug 7 concerned from moving either upwardly or downwardly in the bore 6 whilst nevertheless allowing substantially free angular displacement thereof about the corresponding axis *b*. It is particularly noted that the provision of each groove 16A at a location which is spaced downwardly from the upper end of the corresponding plug 7 by a distance that is substantially equal to one-third of the upright length of that plug 7 enables the plain bearings 9 and 10 to be so positioned that they can readily resist the forces which the progress of the tines 20 through the soil, during operation of the implement, exert upon the bearings 9 and 10 and the tine holders 5 that turnably support the plugs 7 of the swivel units 8. The positioning of the retaining pins 15 at the sides of the holders 5 which face the corresponding shafts 2 ensures that the bores 16 do not become seriously fouled with dirt so that, when required, the retaining pins 15 can be removed and replaced without any serious difficulty. In order to maintain the ready turnability of each plug 7 in th corresponding bore 6, a grease nipple 23 (Figures 3 and 4 of the drawings) is provided in a recess in the wall of each tine holder 5 at the same horizontal level as the corresponding gr ove 16A and communicates with a lubricant chamber surrounding the plug 7, the recess which houses the grease nipple 23 being located at the rear of each holder 5 relative to the intended direction of operative rotation B (Figures 1 and 2 of the drawings) of the

Each swivel unit 8, which integrally includes one of the plugs 7, also comprises an eccentric portion 17 in which an upwardly extending open-ended bore 18 is formed fr m top to bottom. In the embodiment that is being described, the bore 18 is of square cross-section and its longitudinal axis is inclined to the corresponding axis *b* at a small angle which advantageously has a magnitude of substantially 4°, it being evident from Figures 2 and 3 of the drawings that the direction of inclination of the axis of each bore 18 relative to the corresponding axis *b* is downwardly divergent. In the example which is being described, the square cross-section of each bore 18 is so orientated that an imaginary extension of a diagonal thereof would intersect the corresponding axis *b*. It is emphasized that a square cross-section for each bore 18 is not essential and that other angular configurations, particularly rectangular ones, could be employed as alternatives.

Each tine 20 has a cross-sectional size and shape which matches that of the bore 18 which receives a fastening portion 19 of the tine, the tines 20 being formed from rod material that is of a substantially constant cross-sectional size and shape throughout the length of the tine 20. The tines 20 are of straight formation and each of them comprises, in addition to the fastening portion 19 thereof, a soil working portion 22 formed with a steep bevel at its lowermost end which bevel is inclined to the longitudinal axis of the tine 20 concerned at an angle which is preferably not less than 60°, the direction of the bevel being such that the point which is formed between the lowermost extremity thereof and one corner of the cross-section of the material of the tine 20 is radially innermost with respect to the axis *b* concerned and is at the front of the tine relative to the position which the swivel unit 8 concerned will normally adopt relative to the direction of rotation B of the corresponding soil working member 3 during the use of the implement. The upper end of the fastening portion 19 of each tine 20 is cut perpendicularly to the length of that tine and is at a level only just beneath that of the mouth at the upper end of the bore 18 in which said fastening portion 19 is located. A bore is formed through each tine fastening portion 19 in a direction perpendicular to two opposite flat surfaces thereof and registers with a bore formed through the walls of the corresponding eccentric portion 17 at a location which is between the centre and the upper end of the bore 18 concerned. A resilient retaining pin 21 of substantially circular cross-section is entered through the bore in the tine fastening portion 19 and the aligned b res in the walls of the eccentric portion 17 and prevents the tine 20 concerned from being removed from its operativ position until a tool is employed positively to displace the pin 21 from the aligned bores. The use of the resilient retaining pins 21 and the positions thereof in the eccentric portions 17 ensure that

operation of the implement are effectively absorbed without bending or breakage. It will be noted from Figures 2 and 3 of the drawings that, in the normal operative positions of the swivel units 8 in which the eccentric portions 17 and the tines 20 which they carry trail rearwardly of the plugs 7 relative to the direction of rotation B, the leading ends of the retaining pins 21 with respect to the direction B are significantly closer to the corresponding shaft 2 than are the trailing ends thereof. This arrangement tends to prevent accumulations of compacted dirt in the aligned bores which receive the pins 21 so that, generally speaking, very little difficulty will be encountered in removing the pins 21 and subsequently replacing them.

Plates 26 which extend substantially vertically parallel to one another and to the direction A are mounted at the opposite sides or ends of the elongate hollow frame portion 1 and each plate 26 has corresponding arm 28 arranged against the surface thereof which is closest to the centre of the implement in such a way that said arm 28 can turn upwardly or downwardly, as may be required, about a substantially horizontal axis defined by a strong pivot 27 which is connected to the plate 26 concerned and the remainder of the hollow frame portion 1. The substantially horizontal axes defined by the two pivots 27 are coincident and said axis extends parallel to the length (perpendicular to the direction A) of the hollow frame portion 1 at a location towards the front of that frame portion with respect to the direction A. The arms 28 project rearwardly behind the plates 26 with respect to the direction A and their rearmost ends are provided with bearings which carry, between them, a ground roller 29 in a freely rotatable manner. Screw-threaded means 30 is provided to enable the position of the ground roller 29 to be adjustable either upwardly or downwardly relative to the frame portion 1 and it will be appreciated that this adjustment will increase or decrease the maximum depth of penetration of the tines 20 of the soil working members 3 into the ground that is possible. The screw-threaded means 30 which provides this adjustment can be seen in outline in Figure 1 of the drawings but is not described nor illustrated in detail since it may be of a kind which is known *per se*.

The ground roller 29, which is located to the rear of the soil working members 3 with respect to the direction A, is preferably of an open-work cage-like construction that is not illustrated in detail in the drawings since it does not form the subject of the present invention. As well as performing a gentle levelling and consolidating effect upon the soil immediately previously cultivated by the members 3, the ground roller 29 effectively co-operates with those soil working members 3 and performs a soil working function in its own right. In particular, the roller 29 acts to crush any stubborn clods of earth that may be left lying upon the ground surface, or that may be the rotary power-driven soil working members 3. The freely rotatable roller 29 is, of course, revolved about its own longitudinal axis, during operation of the implement, by the contact of a lower region thereof with the soil over which the implement moves. Two shield plates 25 that normally extend substantially vertically parallel to each other and to the direction A are arranged immediately beyond the opposite ends of the single row of twelve (in the example that is being described) soil working members 3 and, during operation, co-operate with the immediately neighbouring soil working members 3 at the ends of said row in cultivating the soil to substantially the same thorough extent as is caused by co-operation between immediately neighbouring soil working members 3 at locations closer to the centre of the implement. In addition, the shield plates 25 prevent stones and other potentially injurious articles from being flung laterally of the path of travel of the implement by the rapidly moving tines 20 of its soil working members 3. Each shield plate 25 is secured to one end of a corresponding arm 24 and a portion of that arm 24 is pivotally mounted in brackets carried on top of the hollow frame portion 1 so that the remainder of said arm 24, and the shield plate which it carries, can be turned upwardly and downwardly about a substantially horizontal axis that extends parallel or substantially parallel to the direction A. This enables the shield plates 25, whose lower edges (not shown) are shaped to slide over the ground surface, to move upwardly and downwardly to match undulations in the surface of the soil which the implement is cultivating when it is in operation. Also, the shield plates 25 can be turned upwardly and inwardly about the corresponding axes through substantially 180° to bring them to positions in which they are disposed above the top of the hollow frame portion 1 to facilitate inoperative transport of the implement.

Each shaft 2 is provided, inside the hollow frame portion 1, with a corresponding straight- or spur-toothed pinion 31, the size of each pinion 31 being such that the teeth thereof mesh with those of the or each immediately neighbouring pinion 31 in the single row of twelve such pinions that can be seen in Figure 1 of the drawings. It will be realised that, with this arrangement, the direction of operative rotation B of each pinion 31, shaft 2 and soil working member 3 is opposite to that of the or each immediately neighbouring similar assembly as is indicated for two such assemblies in Figure 1 of the drawings.

One of the centre pair of shafts 2 in the single row of twelve such shafts has an upward extension through the top of the hollow frame portion 1 into a gear box 32 that is secured in place on the top or cover plate of the frame portion 1. Shafts and bevel pinions (not visible in the drawings) inside the gear box 32 place the upward extension of the shaft 2 that has just been mentioned in driven communication with a rotary

substantially horizontally from the front of that g ar box in substantially th direction A. The back of the gear box, with respect to the direction A, is provided with a change-speed gear 33. The construction of th change-speed gear 33 is not the subject of the present invention and it suffices to say that pairs of toothed pinions having splined hubs can be selectively mounted on the matchingly splined ends of shafts that project into the change-speed gear to give chosen transmission ratios between the rotary input shaft 34 and shafts 2 so that the soil working members 3 can be rotated at faster or slower speeds without having to alter the speed of rotation of the rotary input shaft 34 that is derived, during operation of the implement, from the rear power take-off shaft of an agricultural tractor (or other operating vehicle) through the intermediary of a telescopic transmission shaft 35 (Figure 1) which is of a construction that is known *per se* having universal joints at its opposite ends.

The front of the implement, with respect to the direction A, is provided substantially mid-way across the working width thereof with a coupling member or trestle 36 that is of substantially triangular configuration as seen from either the front or the rear. This coupling member or trestle 36 defines a pair of horizontally spaced apart coupling points for pivotal connection to the free nds of the lower lifting links of a three-point lifting device or hitch at the rear of an agricultural tractor or other operating vehicle and a single upper coupling point for pivotal connection to the upper adjustable length lifting link of the same lifting device or hitch. Downwardly and rearwardly divergent tie bars strengtheningly connect locations adjacent to the apex of the coupling member or trestle 36 to widely spaced apart points at the top and rear of the hollow frame portion 1.

In the use of the cultivating implement that has been described, its coupling member or trestle 36 is connected to the three-point lifting device or hitch of the operating agricultural tractor or other vehicle in the manner that has been briefly described and the telescopic transmission shaft 35 is employed to place the rotary input shaft 34 of the gear box 32 in driven connection with the rear power take-off shaft of said tractor or other vehicle. The maximum depth to which the tines 20 of the soil working members 3 can penetrate into the ground is adjusted, if required and before work commences, by bodily displacing the ground roller 29 either upwardly or downwardly relative to the frame portion 1 and to the remainder of the implement, employing th means 30 which has been briefly referred to above to maintain the arms 28 in chosen angular positions about the axis defined by the pivots 27 thus setting the bodily l vel of the ground roller 29 relative to that of the frame portion 1 and the tines 20 of the soil working members 3. Despite the pivotability of the tine-supporting swivel units 8, the effective distance betw en the two soil working member 3 will, most of the time, be at least equal to the distance (advantageously 25 cm) between the axes of rotation of immediately neighbouring shafts 2 and it will therefore be apparent that the strips of soil that extend in the direction A and that are worked by the individual soil working members 3 overlap, or at least adjoin, one another to form a single broad strip of worked ground which, in the example that is being described, will have a width of substantially, but not necessarily exactly, three metres. It is, of course, possible to employ alternative numbers of the soil working members 3 to give the implement a greater or lesser working width. During the rotation of the soil working members 3 in the directions B, the normally downwardly and rearwardly trailing soil working portions 22 of the straight tines 20 will tend to turn to and fro about the axes *b* of the corresponding plugs 7. Soil presents a constantly changing resistance to the progress of the tines 20 therethrough and the position of each tine 20 around the longitudinal axis of the corresponding shaft 2, in relation to the direction of travel A, is a major factor in determining the position which that tine 20 will tend to adopt around the corresponding axis *b*. Each tine 20 will, in fact, follow an irregular but generally cycloid path around the axis of the corresponding shaft 2 disregarding, in this connection, the progress in the direction A. The right-hand sides of Figures 2 and 3 of the drawings show a central position (in broken lines) of one tine 20 in which it is trailing, perpendicularly behind the corresponding axis *b* in the direction B together with (in Figure 3) a position in which the same tine 20 is shown in full lines and is displaced radially outwardly about the axis *b* from the axis of the corresponding shaft 2 as far as is possible. This position is also shown in Figure 2 and Figure 3 shows a third position of the same tine 20, in broken lines, in which it is displaced radially inwardly as far as possible about the axis *b* and towards the axis of the shaft 2 concerned. This third position is not shown in Figure 2.

Generally speaking, the deviation of each tine 20 about the corresponding axis *b* from the central position that has just been discussed at any time is more or less in accordance with the point in the substantially cycloid path of that tine 20 around the axis of the corresponding shaft 2 which it has reached. Again generally speaking, when the corresponding tine carrier 4 is substantially perpendicular to the direction A, the tines 20 which are indirectly connect d thereto will be in their central positions around the corresponding axes *b* or will deviate from those central position to only a small extent whereas, when the same carrier extends substantially parallel to the direction A, the continuing progress of that impl ment in the direction A will tend to cause the corresponding pair of tines 20 t deviate from their central positions to the maximum possible extent, the leading tine 20 at such time being

concerned whilst the rear tine 20 will be displaced outwardly away from the axis of that shaft 2 to substantially the maximum possible extent. These deviations are, of course, affected to a considerable extent by the nature, consistency and condition of the soil through which the portions 22 of the tines 20 are passing and, in particular, since each tine portion 22 trails rearwardly relative to the direction B and is turnable about the corresponding axis *b*, it can deflect either inwardly or outwardly upon meeting an embedded stone or other hard object so that the likelihood of the tines becoming bent or broken is considerably reduced. Moreover, the swivelling movements of the tines 20 about the corresponding axes *b* significantly enlarges the range of effective actions of each tine 20.

When using the tines 20 that have been described, and that are illustrated in the accompanying drawings, those tines 20 can be formed from rod material of square cross-section in a relatively simple manner merely by cutting them from lengths of that rod material. It is only necessary to make alternate cuts in the rod material in directions that are perpendicular to the longitudinal axis of that material and that are steeply inclined to that axis, the cuts being spaced apart by the required lengths of the tines 20 to produce tines whose fastening portions 19 have flat ends and whose soil working portions 22 have the steeply bevelled ends that have been described above, each tine 20 being reversed end-for-end as it is produced by making these cuts whereby very little, if any, tine material is wasted. The transverse bores in the fastening portions 19 for co-operation with the retaining pins 21 can be formed either before, or after, the tines 20 are actually cut from the rod material,

It will be apparent that, with the construction that has been described, the tines 20 are readily releasable from the eccentric portions 17 of the swivel units 8 so that, when a tine 20 has become so worn that its efficiency is adversely affected, the corresponding retaining pin 21 can be removed and the tine 20 concerned be replaced. The co-operating swivel member 8, however, does not need to be replaced since, usually, it will have received only a relatively small degree of wear. Nevertheless, it is only necessary to knock or push out the corresponding retaining pin 15 to enable the plug 7 of one of the swivel units 8 to be withdrawn downwardly from the bore 6 concerned. Re-assembly can quickly and easily be carried out after, purely for example, the replacement of a badly worn or damaged plain bearing 9 or 10. The assembly which allows each swivel unit 8 to turn freely about the corresponding axis *b* whilst positively preventing movement lengthwise of that axis is particularly simple and inexpensive whilst being very effective and long-lasting. The steep bevel at the lower end of the soil working portion 22 of each tine 20, which normally extends upwardly and r arwardly relative to the corresponding direction of rotation weed remnants or the like is/are quickly shed and keeps the contact b tween the lower ends of the tines 20 and the sub-soil, provided that the implement is correctly adjusted, to a minimum.

Although certain features of the soil cultivating implement that have been described and/or that are illustrated in the accompanying drawings will be set forth in the following claims as inventive features, it is emphasised that the invention is not necessarily limited to those features and that it includes within its scope each of the parts of th soil cultivating implement that has been described, and/or that is illustrated in the accompanying drawings, both individually and in various combinations.

CLAIMS

1. A soil cultivating implement of the kind set forth, wherein the tines are releasably secured to the swivel units by retaining pins.

2. An implement as claimed in claim 1, wherein each swivel unit is prevented from becoming downwardly displaced, relative to the remainder of the corresponding soil working member, by the provision of a retaining pin.

3. A soil cultivating implement of the kind set forth, wherein each swivel unit is prevented from becoming downwardly displaced, relative to the remainder of the corresponding soil working member, by the provision of a retaining pin.

4. An implement as claimed in claim 2 or claim 3, wherein the swivel unit retaining pins co-operate with turnably journalled portions of those units and prevent movements of the units lengthwise of the axes of said turnably journalled portions.

5. A soil cultivating implement of the kind set forth, wherein each swivel unit comprises a turnably journalled portion that is prevented from becoming displaced in a direction parallel to its axis of turnability by the provision of a retaining pin.

6. An implement as claimed in any preceding claim, wherein each swivel unit comprises a portion that is eccentrically disposed relative to the axis of turnability of the unit, said eccentric portion being formed with a bore for the reception of a fastening portion of a corresponding soil working tine.

7. An implement as claimed in 6, wherein the longitudinal axis of said bore is in inclined relationship with the axis of turnability of the same swivel unit, said two axes being downwardly divergent.

8. An implement as claimed in claim 6 or 7, wherein the cross-sectional shape and siz of the bore in the eccentric portion of each swivel unit matches the cross-sectional shape and size of the fastening portion of a tine installed, r destined to be installed, therein.

9. An implement as claimed in claim 8, wherein the cross-sectional shape of said bore in the eccentric portion of each swivel unit is square, or at least rectangular, the bore being so disposed

cross-s ction intersects, or passes close to, the axis of turnability of the same swivel unit.

10. An implement as claimed in any one of claims 6 to 9, wherein ach tine retaining pin is entered through aligned bores in the swivel unit concerned and in the fastening portion of the corresponding tine, said aligned bores being so positioned that the common axis thereof intersects, or passes close to, the longitudinal axis of the fastening portion of the tine concerned.

11. An implement as claimed in claim 10 when read as appendant to claim 9, wherein the common longitudinal axis of the bores in the eccentric portion of each swivel unit substantially perpendicularly intersect two opposite sides of the square or other rectangular cross-section of the bore which receives the fastening portion of the tine.

12. An implement as claimed in claim 4 or in any one of claims 6 to 11 when read as appendant to claim 4, wherein the turnably journalled portion of each swivel unit is in the form of a plug arranged in a bore formed in a tine holder that is integral with, or rigidly secured to, a tine carrier mounted on a shaft defining the axis of rotation of a corresponding soil working member, and wherein each plug is formed with a circumscribing groove into which groove, when assembled, the corresponding swivel unit retaining pin partially intrudes whereby the co-operation of said retaining pin with said groove prevents the plug from being displaced lengthwise of its axis of turnability whilst allowing angular displacement about that axis.

13. An implement as claimed in claim 12, wherein the circumscribing groove is formed in a location between the top and the middle of the corresponding plug.

14. An implement as claimed in claim 12 or 13, wherein each swivel unit retaining pin is disposed substantially tangentially with respect to an imaginary circle centred upon the axis of rotation of the corresponding soil working member and is located at the side of the corresponding tine holder which is closest to that axis of rotation.

15. An implement at claimed in any preceding claim, wherein each swivel unit tine comprises a fastening portion and a soil working portion that are in axial alignment with one another.

16. An implement as claimed in any preceding claim, wherein each swivel unit tine has a soil working portion whose lower end is bevelled, the substantially pointed junction between the bevel and the surface of the tine at the lowermost extremity of said soil working portion normally being at the front of that tine with respect to the direction of rotation of the corresponding soil working member during peration of th implement.

17. An implement as claimed in 16, wherein said, bevel is inclined to the londitudinal axis of th corresponding tine at an angle of not less than substantially 60°.

18. An implement as claimed in any preceding claim, wherein a nipple for the introduction of grease or other lubricant is provided in a wall surrounding a turnably journalled portion, or said turnably journalled portion, of each swivel unit, said nipple communicating with a chamber surrounding that swivel unit portion.

19. A soil cultivating implement of the kind set forth, wherein a nipple for the introduction of grease or other lubricant is provided in a wall surrounding a turnably journalled portion of each swivel unit, said nipple communicating with a chamber surrounding that swivel unit portion.

20. An implement as claimed in claim 18 or 19, wherein each nipple is located at the rear of the wall which surrounds the turnably journalled portion of the corresponding swivel unit with respect to the intended direction of operative rotation of the corresponding soil working member.

21. An implement as claimed in claim 12 or in either claim 18 or claim 20 when read as appendant to claim 12, wherein each lubricating nipple registers with the circumscribing groove in the corresponding swivel unit plug.

22. An implement as claimed in claim 12 or in any one of claims 13 to 18 or claim 20 or claim 21 when read as appendant to claim 12, wherein the bore in each tine holder that receives a corresponding swivel unit plug has its upper end closed by a hood-shaped cap which bears against the top of the plug concerned.

23. An implement as claimed in claim 12 or in any one of claims 13 to 18 or 20 to 22 when read as appendant to claim 12, wherein plain bearings for each swivel unit plug are provided at or close to the top and bottom of that plug.

24. A soil cultivating implement of the kind set forth substantially as hereinbefore described with reference to the accompanying drawings.

25. A soil working tine destined for use in an implement as claimed in any preceding claim, wherein said tine is formed from rod material and is arranged to be maintained in an operative position in a swivel unit of a corresponding soil working member of said implement by a retaining pin.

26. A tine as claimed in claim 25, wherein the tine is f square or other rectangular cross-section and th end of a soil working portion thereof is bevelled.

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